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NOTES ON SOME OF THE CHEMICAL PROPERTIES OF THE MYDRIATIC ALKALOIDS.

By Theodore G. Wormley, M.D.

Several different alkaloidal substances or principles have been discovered as existing in the mydriatic plants; but it is now generally conceded, especially through the researches of Ladenburg, that these consist of three distinct isomeric bodies, having in common the formula $C_{17}H_{23}NO_3$, and named respectively *Atropine*, *Hyoscyamine* and *Hyoscine*, the last named being found only in hyoscyamus niger, associated with hyoscyamine. The substances formerly described as Daturine, from Datura stramonium, and Duboisine, from Duboisia myoporoides, are now considered to be identical with hyoscyamine.

Atropine, hyoscyamine and hyoscine are closely allied not only in their chemical composition, but also in their physiological effects and their general chemical properties, yielding much the same results with the ordinary reagents. According to Ladenburg, atropine fuses at 114° C., hyoscyamine at 108° C. In the free state, hyoscine forms a syrupy liquid, which, with acids, forms crystallizable salts. Other differences have been pointed out in regard to these principles, but these would rarely serve for discrimination in ordinary toxicological investigations.

In the following comparative examination of some of the tests for these substances, recent samples of the three alkaloids as prepared by Merck, Trommsdorff, and by Kahlbaum, were employed. Only one preparation, however, of hyoscine (Kahlbaum's) was examined, this being in the crystalline state, as hydrochloride.

(1) *Vitalis' Test.*—This test, as is well known, consists in treating the solid alkaloid or one of its salts with a drop or two of nitric acid, evaporating to dryness on a water-bath, and treating the cooled residue with a drop of a strong alcoholic solution of potassium hydroxide, when a deep violet coloration is produced.

On comparing the above samples of the three alkaloids, in equal but varying quantities, side by side, under this test, no appreciable difference was observed in the results. It has been stated by some writers that under this test atropine yields a yellow coloration, whereas hyoscyamine yields a purple color; but this difference did not exist in the preparations examined.

(2) *Auric Chloride.*—This reagent throws down from aqueous solutions of salts of the alkaloids, even when quite dilute, a bright yellow precipitate of the aurochloride of the alkaloid. The precipitate from *hyoscine*, being the least soluble of these gold salts, is notably greater in quantity, and it more promptly assumes the crystalline form than the precipitate from like solutions of either of the other two alkaloids.

If a drop of a 1–100th solution of the alkaloids be treated with a drop of the reagent, the hyoscine solution yields a very copious precipitate and soon the mixture becomes a solid, confused crystalline mass. The precipitate from atropine stands next in quantity, that from hyoscyamine being least. No marked difference was observed in the color of the precipitates, even on spontaneous evaporation to dryness.

A drop of a 1–1000th solution of the alkaloids gave with the reagent, very uniformly in the case of hyoscine, a precipitate which quickly formed crystalline lamina or leaves; whilst that from atropine formed minute granules, and that from hyoscyamine crystalline blocks or masses.

(3) *Bromine Test.*—As we have pointed out elsewhere, a solution of bromine in bromohydric acid throws down from solutions of atropine and of hyoscyamine, even when highly dilute, a yellow amorphous precipitate which is soon converted into characteristic crystals, no marked difference being observed between the reaction of the two alkaloids. With an aqueous solution of *hyoscine*, the reagent produces a voluminous yellow precipitate which soon becomes converted into minute globules; these change to large yellow drops, which slowly dissolve to a colorless solution. In no instance

were crystals obtained by the reagent from a 1–100th or more dilute solution of this alkaloid.

This reaction, therefore, serves to discriminate atropine and hyoscyamine from hyoscine, at least from the preparation under examination.

The Bromine reagent may be very satisfactorily applied to atropine and hyoscyamine, and their salts, in the *solid* state. If a minute portion of either alkaloid be touched with a small drop of the reagent, it is *immediately* converted into a mass of crystals, consisting of rough needles, twig-like masses and bright yellow plates.

The residue from one drop of a 1–1000th solution of the alkaloids yields with the reagent, a mass of crystals of the usual forms; and the residue from a drop of a 1–10000th solution, gives a very satisfactory deposit of crystalline needles and granules.

This reaction, as in the case of solutions of the alkaloid, will manifest itself in the presence of comparatively large proportions of foreign matter. Thus, if a drop of a 1–1000th solution of the alkaloid be treated with a drop of ordinary urine, and the mixture evaporated to dryness, the residue will yield, under the reagent, a very satisfactory crystalline reaction, although the proportion of urine solids to the alkaloid present is about 50 : 1. Crystals may be obtained from even a much less quantity of the alkaloid mixed with this amount of urine solids.

If the Bromine reagent be applied to a minute drop of a syrupy solution of *hyoscine*, it is immediately converted into a mass of reddish-yellow globules, which soon change to bold groups of faintly yellow crystals, these being quite different in form from the crystals obtained from the other two alkaloids.

The *residue* from a drop of a 1–100th solution of hyoscine yields, under the reagent, a mass of yellow globules, which soon become converted into groups of bold crystals. From the residue from a 1–1000th solution of this alkaloid no crystals were obtained, the precipitate consisting alone of oily drops.

(4) *Picric Acid.*—A drop of a 1–100th solution of *atropine*, when treated with a drop of an alcoholic solution of this reagent, yields a voluminous yellow precipitate, which slowly becomes converted into minute yellow drops. If, however, the mixture be stirred with a glass rod, it quickly yields beautiful groups of yellow crystals, as figured in *Micro-Chemistry of Poisons*. Pl. xiii, Fig. 1.

A drop of a similar solution of *hyoscyamine* yields, with the reagent, results not to be distinguished from those from atropine.

A like solution of *hyoscine* gives, with the reagent, a yellow precipitate, which remains amorphous; but on stirring the mixture it slowly becomes, on standing, a dense mass of fine, feathery or plumose crystals, markedly different in form from the crystals of the preceding alkaloids. These crystals are less readily formed than those from either atropine or hyoscyamine.

(5) *Platinic Chloride.*—Under the action of this reagent, when applied to somewhat strong solutions, no marked difference was observed between the three alkaloids.

University of Pennsylvania.

STRUCTURE OF GERANIUM MACULATUM.

By Edson S. Bastin.

This plant is popularly known as Cranesbill, and is common in open woods and fields, especially in clayey soil, throughout the northern United States as far west as the States bordering on the Mississippi River, and as far south as Tennessee, but it is rare in the Gulf States, and does not occur in the Rocky Mountain and Pacific Coast floras.

The plant is an erect perennial herb, with slender, forking, hairy stems which attain a height of from ten to eighteen inches. The leaves are of two kinds, radical and cauline, the former, long petiolate, often rising to the height of eight or ten inches from the ground; the latter are much shorter petioled, the upper even almost sessile, and inserted opposite each other on the stem; both kinds are stipulate, and in both the orbicular, deeply cordate lamina is parted into five cuneate divisions, each of which is lobed and cut at the apex. The leaves are also hairy, and when old become blotched with light green, which fact has given origin to the specific name of the plant. The stipules are lanceolate and pointed. The flowers are arranged in umbel-like, few-flowered cymes, and each peduncle bears from one to three flowers. The flowers are pentamerous, regular, symmetrical and hypogynous. The calyx is persistent and chorisepalous; the sepals imbricate in the bud, lanceolate, cuspidate and villous. The rather fugitive choripetalous corolla is light purple and the petals are broad, about one-half inch long, clawed, and the claw is

bearded. The stamens are ten in number, in two whorls, the outer whorl sometimes sterile, but, when perfect, ripening and shedding their pollen before the inner one, and the latter shedding their pollen before the stigmas have unfolded, so that the flowers are protandrous. The filaments are broadened at the base and somewhat

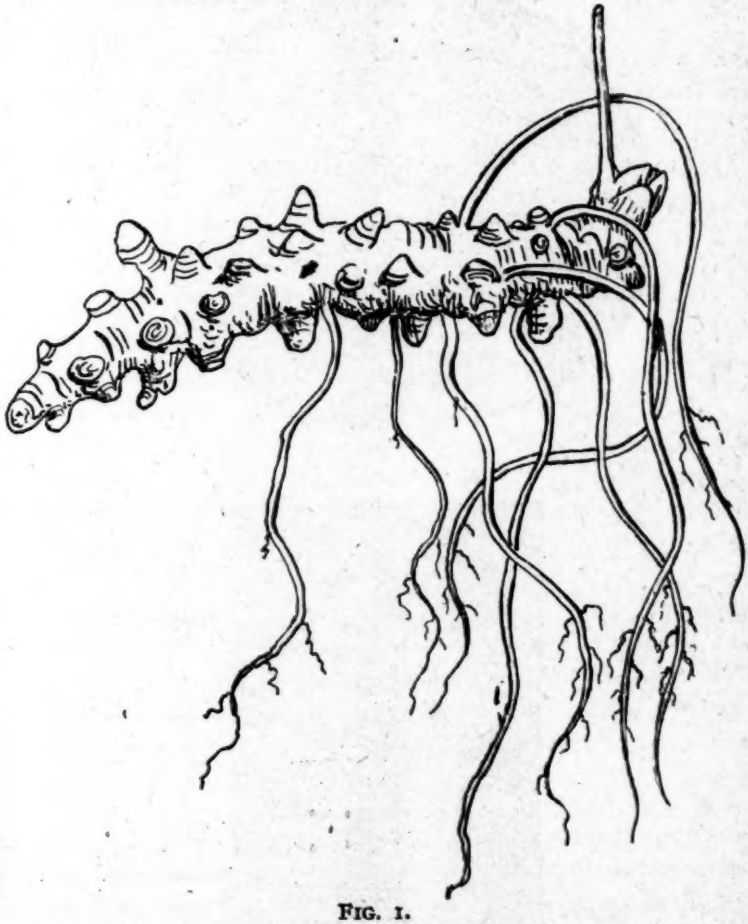


FIG. 1.

united; the anthers are two-lobed and longitudinally dehiscent. The pistil has its five carpels united about a lengthened receptacle, which, along with the adherent portion of the styles, develops in fruit into a long beak. The ovary is deeply five-lobed and five-celled and each cell contains a single seed. Each carpel separates elastically, beginning at the base, from the elongated, persistent receptacle. The

minutely reticulate seeds are exalbuminous, and the cotyledons are plicate and incumbent.

The rhizome, the part employed in medicine, is from two to four inches long, one-fourth to three-fifths of an inch thick, often

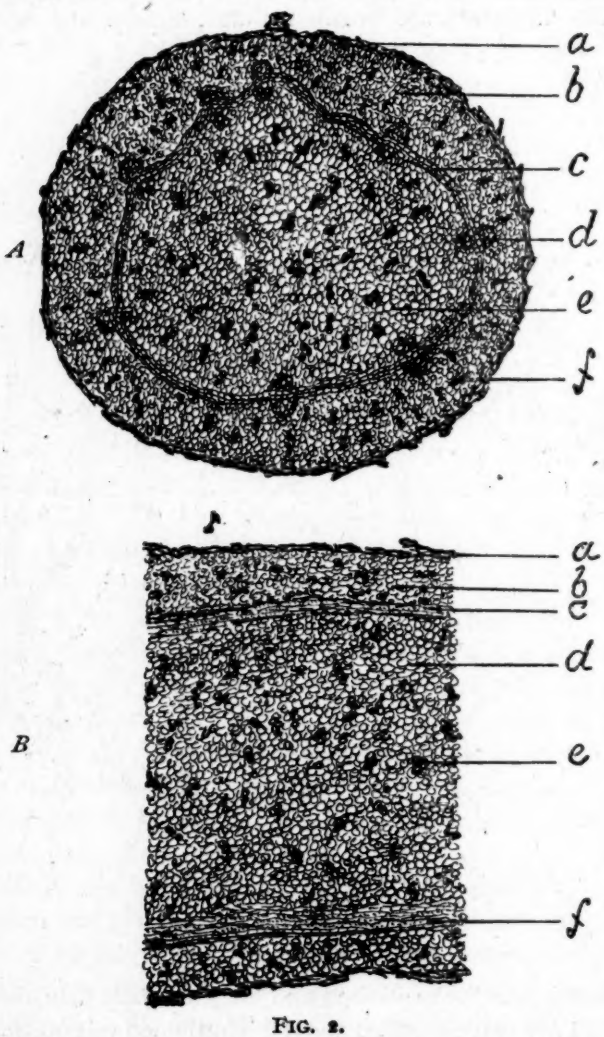


FIG. 2.

branched, bent and strongly tuberculate, dark purplish-brown exteriorly and light purplish-brown interiorly. When dried it is wrinkled longitudinally, and breaks with a short, non-fibrous fracture. The nearly simple roots attain a diameter of about one-twenty-fifth of

an inch at their base, and may spring from any part of the surface of the rhizome, but more abundantly from the sides and lower surface. They may attain a length of five inches, but average somewhat shorter. When dry they are brittle, and in commercial specimens of the drug only the bases of the roots are found present on the rhizome. Both the rhizome and roots are without odor, and possess a purely astringent taste.

A transverse section of the rhizome shows a large pith, a distinct cambium zone, which is seldom circular, approaches much nearer

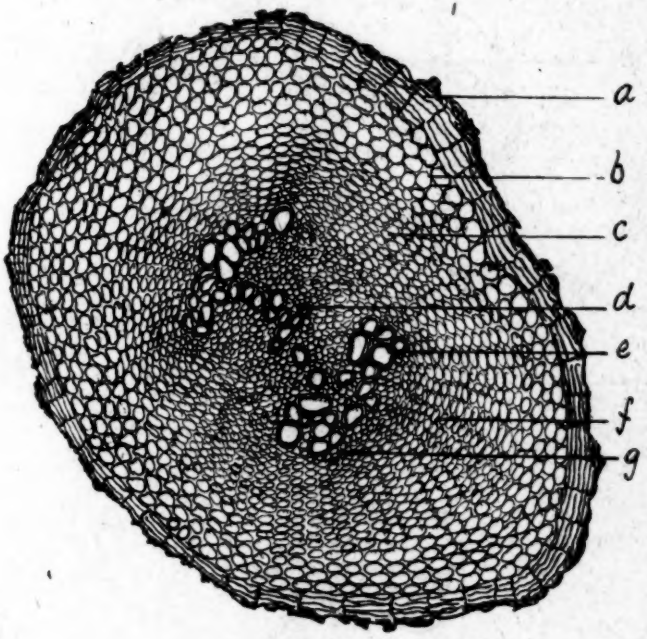


FIG. 3.

the surface at some points than at others, and connects a few vasal bundles that are usually situated at very unequal distances apart. The phloroglucin test shows no lignified tissues except in the xylem of these bundles, and here only the vasiform tissues are stained, no wood-cells being developed. The inner layer of the bark shows no evident radial structure. The outer bark is composed of a thin layer of cork made up of cells considerably elongated in a tangential direction. The exterior of this layer is rough and irregular by reason of the scaling away of the outside tiers of cells.

If the rhizomes are gathered in the autumn of the year, when the vegetative growth of the season has been completed, the parenchymatous tissues will be found heavily charged with starch. If gathered in spring, when vegetation is well advanced, however, the starch may have wholly disappeared, having been employed in the development of the leaves and above-ground stems.

If sections be treated under proper conditions with a solution of ferric chloride, or with a solution of ammonio-ferric alum, the

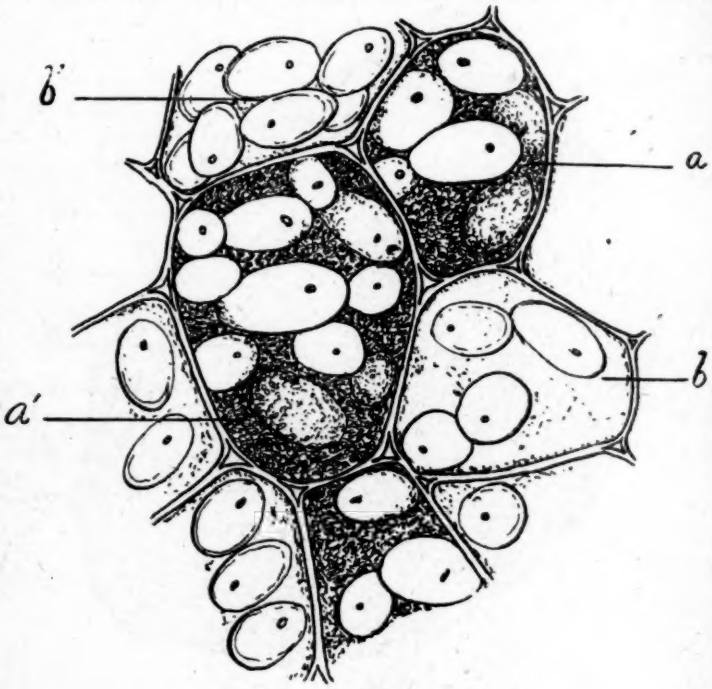


FIG. 4.

copious blue black precipitate produced, due to the presence of tannin, will be found to be much more abundant in some cells than in others, though there are few cells wholly destitute of it. Those in which the precipitate is most copious seem indeed to be chiefly devoted to the secretion of tannin, and they may appropriately be called tannin cells. Besides tannin, however, they usually contain some starch and proteid matter. They commonly occur in clusters of two or more, and these clusters are scattered irregularly through the parenchymatous tissues of the pith and bark. If the section be

cleared by treatment with strong carbolic acid solution, which renders the starch grains transparent, the tannin cells may easily be distinguished from the ordinary parenchyma cells by the abundance of their finely granular contents. The tannin seems to be deposited both in the interior of the cell and in the cell wall.

The xylem portion of the vasal bundles is made up chiefly of small-sized scalariform tracheids and parenchymatous elements.

FIG. 5.

A cross-section of a root usually shows a diarch radial bundle, and although the root early undergoes secondary changes, the diarch character of the bundle remains easily recognizable, and the structure appears quite characteristic. This is shown by an inspection of the drawing, *Fig. 3*, in which *d* represents one of the primary xylem rays, *c* one of the primary phloem masses, and *e* and *f*

portions respectively of the secondary xylem and of the secondary phloem.

It would be interesting to determine by the study of specimens gathered at different seasons of the year whether any relation exists between the amount of starch and the amount of tannin in the rhizomes. Does the amount of tannin in the rhizome increase as the starch diminishes, or is the amount of starch totally independent of that of tannin?

The starch of geranium is rather characteristic. The grains are smooth, mostly long, ovate in outline, with the hilum located near the larger end. The hilum is occasionally fissured, but is usually unfissured. The grains are very seldom double, but sometimes binucleated. About the hilum are a series of curves, those nearest it circular and concentric with it, while those farther away are more elliptical and eccentric, and the more eccentric the more remote they are from the hilum. The longest grains are about the $\frac{1}{700}$th of an inch in length. The polarization cross is very unequal-armed, as shown in *a*, *Fig. 5*.

DESCRIPTION OF FIGURES.

Fig. 1.—Rhizome and roots of Geranium maculatum, *L.*, natural size.

Fig. 2.—Sections of a rhizome magnified twelve diameters.

A. Transverse section; *a*, corky layer; *b*, middle layer of bark; *c*, cambium zone; *d*, vasal bundle; *e*, pith; *f*, cluster of tannin cells.

B. Longitudinal section; *a*, corky layer; *b*, middle layer of bark; *c*, cambium zone; *d*, pith; *e*, cluster of tannin cells; *f*, vasal bundle. The sections from which drawings were made had been cleared of starch.

Fig. 3.—Cross-section of root magnified 75 diameters; *a*, corky layer; *b*, primary cortex; *c*, primary phloem; *d*, primary xylem ray; *e*, secondary xylem; *f*, secondary phloem; *g*, cambium.

Fig. 4.—A few tannin and ordinary parenchyma cells from pith of rhizome magnified 375 diameters. *a* and *a'* tannin cells, also containing starch grains; *b* and *b'* ordinary parenchyma cells.

Fig. 5.—Starch of Geranium magnified 750 diameters. *a*, one of the grains as viewed by aid of polarized light.

A NEW DIAPHRAGM.

By Hans M. Wilder.

When we wish to study an object by the microscope, we can make use of four kinds of illumination: (1) Ordinary day-light or lamp-light. (2) The same intensified by a condenser. (3) Dark-ground illumination. (4) Polarized light.

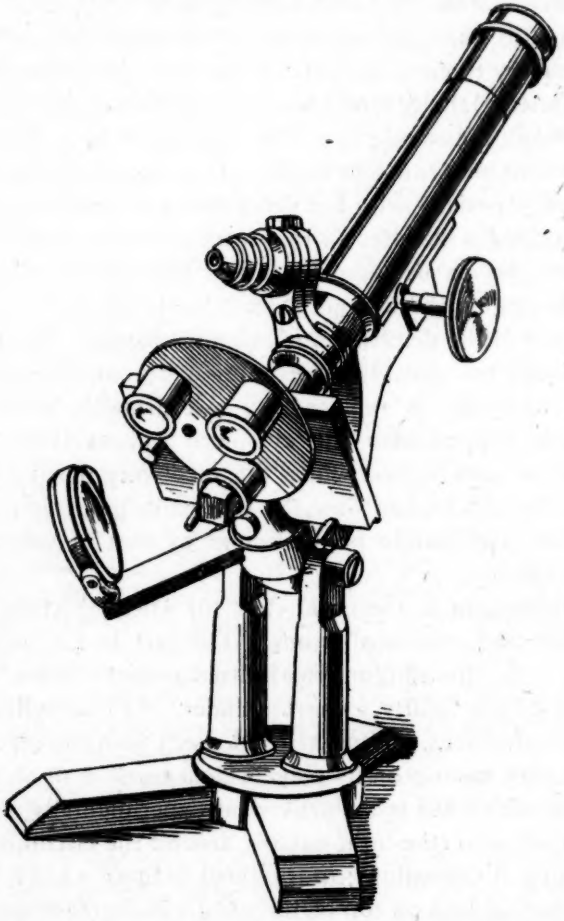
Hitherto, in changing from one illumination to another, it has been necessary to consume not a little time in exchanging (respectively, inserting) the different lenses required, and, after using them, to go through the same process in inverse order. This is tedious and time-consuming, not to mention that one is apt to forget what he noticed, especially with the other kinds of illumination.

My diaphragm obviates all this trouble, and makes any necessary change as easy as winking the eye. Instead of unscrewing and again screwing on the various lenses, a mere quarter of a revolution of the wheel of the diaphragm effects the change. For polarization an additional, but quickly-made motion becomes necessary. The ordinary analyzer is replaced by a tourmalin, which, suitably mounted, is slipped over the eye-piece and revolved. It has the additional advantage, that whilst the nicol very much restricts and circumscribes the field of view, the tourmalin gives an unobstructed field. The modification of the colors by that of the tourmalin is hardly noticeable.

The diaphragm is the usual disk (or wheel) pierced with three large holes and one smaller one. The last is for ordinary light. Into each of the three larger holes is fitted a short "sleeve," into which again fits, a little tightly, a short cylinder. In one cylinder is fitted a hemispherical lens, serving as condenser; into the second is fitted a similar lens, having on its plane side a small disk of black paint, the size of which has to be arrived at experimentally, so as to give a good black field (the light coming around the circumference gives dark-ground illumination); in the third is fitted a nicol (polarizer); a hemispherical lens on top of the nicol will increase the brightness of the colors.

I use "hemispherical" lenses in preference to the usual "plano-convex," because the focus of the former is much shorter. The condenser may be made to give a perfectly blinding light, suitable for the most difficult bacteria, and, by gradually withdrawing the tube, the light can be softened down to almost any extent, using in

addition a judicious handling of the mirror. It has been pointed out that an "Iris" diaphragm should be attached to it. True! But then we cannot have everything. There is, however, nothing to hinder anybody from adding an additional sleeve suitable to take the "Iris," replacing the small hole, but it is hardly necessary.



This diaphragm is a handy one, aside from the convenience, saving an outlay of $15 to $25, if the ordinary accessories had to be used; the details may be improved, however.

It can be added to any microscope, and it is not absolutely necessary to get an optician; any pattern-maker can make the brass parts.

It is not patented.

OINTMENT OF MERCURIC NITRATE.

By Charles H. LaWall, Ph.G.

Unguentum Hydrargyri Nitratis, or Citrine Ointment, as it is commonly called, is one of the most difficult preparations of the Pharmacopœia to make, and at the same time obtain uniform results. This is not due to lack of research and experiment, for scarcely a preparation of the Pharmacopœia confronts us with such an array of literature regarding its preparation and ingredients, as this one. Considering this fact, as well as the age of the compound, which dates from the seventeenth century, it is surprising to note how many otherwise skilful pharmacists attain very unsatisfactory results in making this ointment.

It is not the purpose of this article to give an historical account of Citrine Ointment, as that has been ably done in several previous articles.[1] However, it would not be amiss to mention some of the fats suggested at various times as a substitute for the lard oil of the present official preparation.

Neatsfoot Oil,[2] Lard,[3] Butter,[4] Peanut Oil[5], Almond Oil[6], Castor Oil,[6] Palm Oil,[6] Bear's Oil,[7] Ox Marrow,[8] Beef Suet,[9] Stearic Acid,[10] Petrolatum,[11] and almost all of the other fats from the animal and the vegetable kingdoms, and even one from the mineral kingdom, appear to have been experimented with in the vain hope of finding some fat or oil which would make a good and durable ointment.

Several writers have taken another course and have tried to preserve the products obtained from former processes. One advises keeping the ointment in a jar and covering it with a layer of glycerin to prevent oxidation[12]; others have tried the addition of cam-

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[1] Am. Jour. Phar., 54, p. 618; 41, p. 211.
[2] Ibid. 1, p. 171, 3, p. 85.
[3] Ibid. 13, p. 101.
[4] Ibid. 14, p. 110: 30, p. 102; 54, p. 586.
[5] Ibid. 30, p. 102; 45, p. 460.
[6] Ibid. 30, p. 102.
[7] Ibid. 32, p. 212.
[8] Ibid. 49, p. 551.
[9] Ibid. 51, p. 438.
[10] Ibid. 51, p. 438; 58, p. 8.
[11] Ibid. 58, p. 8.
[12] Ibid. 52, p. 300.

phor[1]; still others have given their attention to the mercurial portion of the ointment, and suggest making the nitrate from the oxide of mercury instead of making it from the metal.[2] Some have even been skeptical as to the reliability of any process[3], but those who have approximated the truth more nearly are they who advise careful manipulation, especially as regards temperature.[4]

In regard to the selection of Lard Oil as the official base for the ointment, experiments have proven[5] that it is superior to all other oils suggested, consequently the fault does not lie there. The chief difficulty appears to lie in disregarding the temperatures to be observed during the operation.

It is to be regretted that so many good pharmacists neglect the use of a thermometer in the manufacture of those preparations of the Pharmacopœia which require the use of this valuable instrument.

The temperatures which are advised in the working formulæ of many of the official preparations have been found by actual experience to give the most satisfactory results in practice, yet many pharmacists neglect this important feature, and then complain about the formulæ in the U. S. P.

However, in the case of Citrine Ointment, the official process does not give uniform results even with careful manipulation. The reactions appear to be satisfactory, but the finished preparation is generally found to be spongy or granular. This is especially the case when working with large quantities, and constitutes a very serious annoyance.

While experimenting to overcome this difficulty a process was found which gives excellent results with either large or small quantities, and it has been used for some time with satisfactory results. The official ingredients and quantities are used, and the following instructions regarding temperatures must be carefully adhered to

First, heat the lard oil to 100° C., as in the official process, remove heat, add the nitric acid without stirring, and reapply heat when effervescence ceases, till all gas is expelled. It is best to use a vessel of

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[1] Am. Jour. Phar. 14, p. 110; 54, pp. 145-232.
[2] Ibid. 58, p. 8; 34, p. 394.
[3] Ibid. 37, p. 296.
[4] Ibid. 4, p. 197; 14, p. 61; 22, p. 119; 32, p. 272; 41, p. 211.
[5] Ibid. 55, p. 438.

six times the capacity of the quantity to be made to allow for the copious effervescence which takes place. When the foregoing mixture has cooled to 40° C., the solution of mercuric nitrate is added and the temperature is raised gradually to 60° C., and maintained until no further evolution of gas is noticed. If it is then agitated until cold, as usual, the resulting product will comply with the requirements of the Pharmacopœia.

Ointment made by the U. S. P. method, which has become spongy, may be remedied by elevating the temperature to 60° C. and cooling with agitation.

NITRO-GLYCERIN IN THE PHARMACOPŒIA.

By J. B. Nagelvoort.

A dozen good pharmaceutical journals do not mention the fact that nitro-glycerin can be washed out of its alcoholic solution, and that a fairly accurate and practical quantitative estimation of nitro-glycerin in alcoholic solutions can be based upon this property. The following simple method does not seem to have deserved a place in the hand-books on pharmaceutical chemistry, either.

When it is taken into consideration that it is better to have a quantitative estimation of some kind than none at all, in the case of such a powerful medicine as nitro-glycerin, it might appropriately be published how I ascertain, in perfect safety for the manufacturer and myself, the percentage strength of the Pharmacopœial

SPIRIT OF NITRO-GLYCERIN.

When I remember that it must be about ten years since solutions of nitro-glycerin were introduced into pharmacy, this lack of information on this subject is astonishing, notwithstanding the fact that the Pharmacopœia has no better offer to warrant the dispenser that he furnishes a 1 per cent. solution of nitro-glycerin, than a clear, colorless liquid, specific gravity, etc.

As a starting-point, can safely be assumed the purchase of a 10 per cent. alcoholic solution of nitro-glycerin from one of the manufacturers of dynamite or giant powder. I advise even to buy such a solution and dilute it to its required strength.

When such a purchase is made in the winter, one has to know very well what he is about. A few years since, when a workingman

brought me a gallon bottle, filled with an alcoholic solution of nitro-glycerin, in which laid at least 500 cubic centimetres of undissolved nitro-glycerin on the bottom, I escaped annihilation by a hair's breadth. With a question, "I would like to know what that oil is?" he gave the bottle a smart rap on my table, and pointed to the nitro-glycerin that had settled in the cold weather.

Cool a quantity of such a 10 per cent. alcoholic solution of nitro-glycerin to 15° C. Take 50 cubic centimetres of it; pour this quantity into 2 litres of water; agitate the mixture and set it aside in a cool place over night. (In cold weather, take care that the water cannot freeze and break the bottle so as to endanger your life.)

The next morning, siphon off the water, only leaving enough in the bottle to transfer the nitro-glycerin—which has separated and lies as a syrupy fluid on the bottom—into a 50 cubic centimetre graduate which is graduated into ½ cubic centimetres. Use a funnel; this insures against loss; let the funnel drain.

If the 10 per cent. alcoholic solution of nitro-glycerin is of the required strength, there should be about 2·5 cubic centimetres of nitro-glycerin in the graduate. I seldom have reason to complain about the strength of solutions sold as 10 per cent.

Since we measure, instead of weigh, our nitro-glycerin, its volume has to be multiplied by its specific gravity, which is 1·60, in order to obtain its weight. $2,5 \times 1{\cdot}6 = 4$.

Applying a correction for the solubility of nitro-glycerin in a large quantity of water (Allen says, "Commercial Organic Analysis," Vol. II, p. 305, it is 1 gram in 800 cubic centimetres), it is a simple calculation to verify the fluid under examination.

Dilute according to the figures found, to pharmacopœial strength. This is more satisfactory than to believe a statement on a label.

Perhaps it is not superfluous to advise one to pour the nitro-glycerin which has separated, into a well, creek or river, if he does not intend to dissolve it for future use.

DETROIT, October 3, 1894.

FACTS IN BRIEF FROM THE LIFE OF MICHAEL FARADAY.

Compiled from "Thorpe's Sketches in Historical Chemistry."

Written for the AMERICAN JOURNAL OF PHARMACY.

BY WILLIAM B. THOMPSON.

Born in England, 1791. Poor, with limited schooling. Errand boy at twelve, to bookseller. Love of books led to pursuit of knowledge. Watts on the Mind, and Mrs. Marcet's conversation on chemistry, inculcated the habit of reflection and observation, and aroused love for science. Frequently went, during boyhood, to hear Sir Humphrey Davy lecture at the Royal Institution. Finally, became, ere he reached twenty years, laboratory assistant and amanuensis to Davy. He took copious notes of Davy's lectures, amplified them and illustrated them with rude sketches or drawings of apparatus. Travelled on the Continent and through Italy with Davy and his spouse, acting, partly, in the capacity of valet, much to Faraday's disgust. Expresses his preference for the pursuit of science to that of the occupations of trade as follows: "To escape from trade because of its viciousness and selfishness, and to enter the service of science in order to cultivate the amiability and liberality of feeling which pertains to its votaries." During the first decade of the present century and during Faraday's pupilage, Davy discovered the metallic state of potassium and determined the elementary character of iodine. (One Courtois, a manufacturer of saltpetre at Paris, is credited with the discovery of iodine in 1812.) Faraday delivered his first lecture January 17, 1816, to the City Philosophical Society, on "The General Properties of Matter." With Faraday lecturing was an art to be acquired. He was original in thought and copious in illustration. He carefully and systematically studied the art of lecturing in a manner to secure attention and impart knowledge. In order to cultivate grace of manner and give greater force and expression to his teaching, he took private lessons in elocution. He possessed the faculty of interesting the young and evinced a remarkable talent in his ability to convey information, especially to the youthful mind. Faraday received no less than ninety-five honorary titles and marks of merit from the various learned societies existent in Europe and America. In 1829 he became connected with his government in a scientific capacity. He was called upon to investigate causes of mine explosion. To devise ventilation for

lighthouses. The adaptability of lightning conductors. Analyzing and supervising means to protect drinking waters. In 1816 Faraday made his first contribution to literature in an analysis of *native* caustic lime. Between 1816 and 1820 he contributed thirty-seven notices and papers to the *Quarterly Journal of Science.* In 1823 he liquefied chlorine. In 1836 he discovered *benzene* (which he termed bicarburet of hydrogen) among the products of condensed oil gas. In this he may have laid the foundation of the discovery of the so-called aniline dyes, enormous quantities of benzene being used in the production of these beautiful colors. In 1831 was published the first series of his experimental researches in electricity—including magneto-electricity, voltaic induction and definite electro-chemical decomposition. His opinion of the value and usefulness of study is summed up in his own words, as follows: "I do think that the study of natural science is so glorious a school for the mind that, with the laws impressed on all created things by the Creator, and the wonderful unity and stability of matter, there cannot be a better school for the education of the mind." When nearly seventy years of age the Queen offered him, in consideration of his eminent service and distinguished ability, a house and home on Hampton Court Green, where the decline of his life was passed in that serene quietude so grateful to the mind in state of contemplation. Seated in his chair he passed peacefully from earthly life in August, 1867. Assuredly, the mind of Faraday was of noble cast. Yet he started career with but meagre aids to its development. But, herein lies the useful lesson afforded by the history of his life.

SEPTEMBER 29, 1894.

THE MATERIA MEDICA OF CEYLON.*

BY HENRY KRAEMER.

A year ago, if one took the time and pains, he could not but be impressed, indeed, with the exhibits of Materia Medica by the Oriental and European nations at the World's Columbian Exposition. There were pounds of the important alkaloids of Cinchona, Opium, Coca, etc., small quantities, but sufficient to demonstrate the

* Read at the North Carolina Pharm. Assoc. Meeting, Sept., 1894.

rarer alkaloidal combinations and derivatives, and probably all of the newer synthetic medicinal products. The newer anæsthetics and hypnotics, with the host of the other newer remedies, were arranged in striking contrast with the oldest known forms of medicaments. Chief among the oriental nations in displaying her products was Ceylon. In an economic sense her exhibit was remarkable to the student. They exhibited tea and coffee from more than 100 estates, one sample of tea being valued at $175 per pound. Her "Courts" were constructed entirely of native woods. Some 20,000 cubic feet of timber from twenty-two different trees were expressly felled and hewn for this purpose. Indeed, every product of the soil that could be utilized in manufacture, art, medicine or food was in the main displayed. The object of this paper is to record some of the facts regarding the practice of medicine in the Sinhalese and the commoner products employed, the information relating thereto having been in the main obtained as a result of the celebrated exposition.

One of their writers says: "In Sinhalese medical practice, disease is held to be a disturbance in the equilibrium of the three humors—air, bile and phlegm—which pervade the human system. These agents preside over certain vital functions, and while susceptible of being affected by temperature, diet, drugs, habits, etc., react on the organ whose functions they control. Every individual is supposed to be born with a predisposition to some one of these humors, or to a modification of one of them in combination with some proximate principle, corresponding with the nervous, bilious, phlegmatic and sanguineous temperaments formerly recognized in the practice of the medicines of Europe. The object of treatment, is therefore, to ascertain the mutual relation existing between these three humors in the patient and to bring about an equilibrium between them. Crude as this theory may appear, it is essentially the system which, borrowed from India by the Greeks and Arabians, entered more or less into all European systems of medicines till the close of the seventeenth century.

"Of the five or six hundred different causes of disease recognized in Sinhalese medicine, more than a fourth are ascribed to the abnormal conditions of the three humors, and the remainder to vitiation of the seven proximate principles of the human body, viz.: blood, flesh, fat, etc. Hence diseases are not classified by their symptoms so much as by their causes, and accidental symptoms are

not only confounded with essential ones, but receive special treatment as distinct diseases. The treatment accordingly is more theoretical than empirical, every symptom being referred to some deranged humor, which alone receives attention, and has to be rectified according to the rules laid down by recognized authorities. The true significance of any group of symptoms as indicating any definite morbid condition or any particular stage of disease, is barely, if at all, realized by the native practitioner, their only value being to assist the memory to recall the particular Sanskrit stanza which details the orthodox treatment to be adopted under the circumstances. No attempt is made to anticipate or arrest morbid changes or guide them to a healthy issue, except in so far as this is included in the general line of treatment, for the simple reason that a pathology based on actual observation of the dead body finds no place in the native text-books of medicine, and no native practitioner, however experienced, would care to verify by a post-mortem examination the fanciful theories on which their system of medicine is founded. A very common practice with native practitioners is to allow a disease to progress for some time with a view to 'mature' it or 'to bring it to a head' before any attempt is made to remove it. A quick recovery, whether under European or native treatment, is deprecated as likely to lead to a relapse, since sufficient time has not been allowed for the restoration of a permanent healthy equilibrium between the contending humors.

"They have great faith in critical days, and in the influence of the different phases of the moon, each of which is suffered to preside over its own set of organs, so that purgatives, for instance, however much they may be needed in any given case, are never prescribed on the day (kala) on which the moon exercises its influence on the bowels, nor emetics on the day on which it presides over the stomach, etc. As they seldom make use of powerful or hurtful remedies, however, and are content in the majority of cases to relieve disease chiefly by acting on the emunctories by means of emetics, purgatives and low diet, native practice is usually not often mischievous even when it fails to effect a cure. In most cases the treatment only serves to change an acute disease into one of a chronic character, while recovery from a simple affection is protracted, the patient being kept half-starved on gruel and made to swallow large quantities of infusions and decoctions of medicinal herbs, the number of

ingredients in each potion increasing in direct ratio with the continuance and severity of the disease. A mild form of fever would be treated with a decoction of the 'Five Minor Roots:' *Desmodium gangeticum, Uraria lagopodioides, Solanum Jacquini, S. indicum* and *Tribulus terrestris*, which are believed to cure fever due to deranged phlegm, catarrh, etc. A severer form would be ascribed perhaps to deranged air, requiring the use of the 'Five Major Plants:' *Ægle marmelos, Calosanthes indica, Gmelina arborea, Stereospermum suaveolens* and *Premna speciosa.* In remittent fever, etc., all ten may be prescribed together, and in typhoid fever, with head symptoms, the same with the addition of eight or ten other ingredients."

When conducted by intelligent and skillful practitioners, native practice, it is said, is not unlike the modern treatment of medicine in Europe. Unfortunately, however, the practice of native medicine has fallen into the hands of men, many of whom do not possess even the little knowledge which may be gathered from the medical books in the vernacular. The following list of vegetable drugs is selected as being used by the native practitioners, and is derived from plants indigenous to Ceylon. The uses given under each one have been taken down at first hand from the mouths of the *vedaralas*, or village doctors, themselves. It must not, however, be supposed that they are in all or even in a majority of cases, based on any real properties. Much is considered to be traditional merely, or empiric and in much the same manner as up to the seventeenth century in Europe, numerous plants which are now considered quite inert, were credited with virtues on the authority of older writers and astrologers. The extreme complexity of Sinhalese prescriptions (many of which are of great antiquity and handed down from generation to generation,) must often render it impossible to distinguish the effects of any particular ingredient:

Abrus precatorius, Linné (Olin-da-wel). N. O. Leguminosæ. The seeds of this plant have been used for many years by the inhabitants of the West Indies, for the making of various articles of decoration. Some time ago it attracted considerable attention as "the weather plant," or vegetable barometer, and later it was said to be used habitually by the "chamars," or native hide-traders in the neighborhood of Calcutta, as a cattle poison. In this latter use the seeds, kneaded into a paste, were smeared on tiny pegs of bamboo, and with these they pierced the cows' hides. The *kooch* poison, when taken internally, has, however, been found to be uninjurious, and another extraordinary fact said to be discovered is that a cow treated inwardly with certain preparations of the *kooch* poison becomes proof against being poisoned by subsequent pin

punctures. Should this prove to be so, there is reason to believe that the opinions of Cornil and Berlioz, who declare that the "bacteria of jequirity are its only active principles," are not wholly contradicted. *Abrus precatorius* is a copiously branched climber, with slender branches. Leaflets are small and possess a sweet licorice-like taste. Racemes many flowered, corolla reddish or white. Pod one to one and one-half inches long. Seeds bright scarlet to black, or black, or whitish, or mixed black and white. In Ceylon the juice of the green leaves is used for purification of the blood, especially in females. The root for sore throat, leprosy, stiffness in joints, paralysis and nervous diseases. Externally it is applied to ulcers and sores.

Acacia intsia (see *Mimosa intsia*).

Adenanthera pavonina, Linné (Madatiya). N. O. Leguminosæ. An erect tree without spines or tendrils; leaves ample, bipinnate, pinnæ short stalked; flowers minute in narrow spike-like racemes; pod strap-shaped, six to nine inches long, falcate, ten to twelve seeded; seeds bright colored. The leaves and the bark in combination with other medicines are used to reduce the swellings of sprains and bruises. In case of snake-bite by the polonga, if the wounded part is stroked with a bundle of leaves several hundred times, it is believed that the poison will be expelled.

Adhatoda vasica, Nees (Adhatoda). N. O. Acanthaceæ. A dense shrub, sometimes arborescent; leaves elliptical, acute at both ends, entire, minutely pubescent; spike dense, short, corolla white; capsule, clavate, pubescent, four seeded; seeds, glabrous tubercular-verrucose. It is frequently cultivated. The root, leaves, flowers and bark are used in diseases caused by excessive phlegm, also in menorrhagia and in rheumatism.

Ægle marmelos, Correa (Beli). N. O. Rutaceæ. The "Bael" is a small deciduous tree with straight, strong axiliary spines one inch long. Leaflets three to five, ovate lanceolate, lateral sessile, terminal long-petioled. Flowers, greenish-white, sweet scented. Fruit two to five inches in diameter, globose, oblong or pyriform, rind gray or yellow, pulp sweet, thick orange-colored. The root, bark and leaves are employed for flatulency and in low fevers attended with biliousness and diarrhœa. The unripe fruit boiled and then baked under hot ashes checks diarrhœa and dysentery. The ripe fruit is cooling and laxative, and a good remedy for piles. A sweet scented extract from the flowers is used as a lotion for the eyes.

Ærura lanata (Polkudupala). N. O. Amarantaceæ. Much employed for coughs; as a vermifuge for children and in indigestion.

Aliesomeles ovata (Yokwansa).—The leaves, bark and root are used in colic, catarrhal fever, cough and similar diseases.

Alysicarpus bupleurifolius D. C. (Aswenna). N. O. Leguminosæ. An annual or biennial; stems 1–2 feet ascending, glabrous; leaflets linear or lanceolate, 1–3 inches long, rounded at the base; flowers in racemes, calyx much longer than the first joint of the pod, its teeth imbricated in the fruiting stage. It is a mild astringent. The root is used in admixture with other medicines in mild fevers. The leaves are locally applied to wounds and bruises.

Atalantia ceylonica, Oliv. (Yakmaran). N. O. Rutaceæ. A bush or small tree, unarmed or armed with very straight spines ¼–1 inch long. Leaflets variable; flowers very shortly racemed. It is common in the warmer parts of

Ceylon and the leaves and roots are used in catarrhal fever, cough and similar troubles.

Andropogon muricatus (Sevendara) N. O. Gramineæ. The roots are used in bilious fever.

Azadirachta indica, Adr. Juss. (Kohomba) N. O. Meliaceæ. Now placed by Hooker (Flora Brit. India) in Melia and called Melia Azadirachta, Linné. It is a tree common throughout the greater part of India. In size it is 40–50 feet. Flowers, whitish, honey-scented. Leaves, 8–15 inches long, crowded near the ends of the branches. The seeds supply an oil (see Buchanan Journ. Madras 1, 9); a gum also exudes from the tree (Buchanan, l. c. 188). The wood resembles mahogany and the bark is very bitter. The juice of the leaves is used for injuries to the eyes and to kill intestinal worms. The bitter bark is employed in fevers and convulsive diseases. The fruit is vermifuge and purgative. The oil extracted from the seeds is a good external remedy for rheumatism caused by exposure to cold air.

Barleria prionitis, Linné. (Katukarandu). N. O. Acanthaceæ. A bush 2–5 feet high, usually very prickly. Leaves, entire; flowers, axillary; fruit, a capsule. Occurs in tropical India from the Himalayas to Ceylon and Malacca, probably in most cases introduced as it is used for the preparing of hedges. It is said to be a cooling diuretic and tonic. The whole plant is used in urinary and paralytic affections, rheumatism, jaundice, hepatic obstruction and dropsy.

Bassia longifolia, Linné. (Mi.) N. O. Sapotaceæ. A common tree, 50 feet high; leaves clustered towards the ends of the branches, all of the young parts rusty tomentose. Leaves, lanceolate, narrowed at both ends, glabrous, distinctly nerved; stipules linear; pedicels 1–2 inches long, tomentose, in dense clusters near the ends of the branches. This tree yields a valuable timber and the flowers and fruit furnish a nourishing jelly. The bark is slightly astringent and rather pleasant. It is used as an appetizer and in rheumatism. The leaves and bark, as well as the fixed oil of the seed are used in rheumatic and cutaneous diseases. The oil from the seeds is the greenish *Elloopa oil* which is used externally.

Bombax malabaricum D. C. (Katu-imbul) N. O. Malvaceæ. A large tree covered with short, hard conical prickles, branches spreading; leaflets 6–12 inches long, glabrous, petiole longer than the leaflets, secondary petioles 1 inch. Flowers, numerous, fascicled at or near the ends of the branches; corolla, 6–7 inches, red or white. Capsule, 6–7 inches long, ovoid, downy, valves silky within. It is called *cotton tree* and grows through Eastern Himalaya and throughout the hotter forest regions of India to Burmah and Ceylon. The roots are employed as a restorative, astringent, and alterative; externally they are applied for swellings and rheumatic pains.

Calotropis gigantea, R. Br. (Wara). N. O. Asclepiadaceæ. A shrub with thick herbaceous branches, bark thick, soft, wrinkled, ash-colored. The young shoots, under-sides of the leaves and inflorescence are covered with soft wooly trichomes. Flower, purplish, lilac or white; flowering nearly throughout the year. One of the most common plants in dry waste places. The fibre from the inner bark was formerly used for the manufacture of cloth for the princes and nobles. The hairs of the seeds are said to be made into thread in Borneo. Attempts to weave it have been made in Madras. Gunpowder charcoal is made

from the young branches. The bark is described, with analysis made therefrom, in the Pharmacographia and the National Dispensatory. All parts of the plant are full of an acrid milk which possesses powerful medicinal properties. The green leaves are locally applied to dispel swellings. The root is a useful tonic, good in coughs and catarrhs. The milk of the plant is internally used as a cure for leprosy.

Cardiospermum halicacabum, Linné. (Penela-we) N. O. Sapindaceæ.—A climbing herb, branches slender, furrowed; leaves, deltoid or ovate, leaflets deeply cut; flowers, white and small; seeds officinal. The whole plant is used in cases of rheumatism, nervous diseases. orchitis and dropsy. It is used also as a hair-wash to remove scurf, The root is considered aperient.

Cassia alata, Linné. (Rata-tora) N. O. Leguminosæ. –A shrub with very thick but finely downy branches; leaves, subsessile, 1–2 feet long; leaflets oblong 16–28, rigidly subcoriaceous, rhachis narrowly winged on each side of the face; racemes, narrow, corolla, yellow distinctly veined; pod long, ligulate with a broad wing down the middle of each valve. The wood is used as an alterative.

Cassia auriculata (Ranawara) N. O. Leguminosæ.—A tall shrub with the virgate branches and underside of the leaves possessed of a fine gray down. Leaves nearly sessile, 3–4 inches long; leaflets obovate-oblong, rigidly subcoriaceous, ¾–1 inch long, obtuse or emarginate; furnished with glands on the main rhachis between the leaflets; stipules large and foliaceous. Flowers very large and showy, bright yellow in copious corymbose racemés. It is doubtful if the seeds are still used in the treatment of ophthalmia. The bark and roots are used as an alterative. The dried leaves in the form of a tea are likewise employed for the same purpose.

Cassia fistula, Linné. (Ehela). N. O. Leguminosæ.—A middle-sized tree, glabrous in all its parts. Leaves a foot or more long, leaflets 8–16, 2–6 inches long, ovate, distinctly stalked, usually acute, rigidly subcoriaceous, pale green, strongly veined. Racemes as long as the leaves. Pod well known in medicines. The tender leaves are employed in rheumatic fever as a mild purgative, and the bark in combination with other ingredients is used in rheumatism.

Celtis cinnamomea, Lindl. (Gurenda). N. O. Urticaceæ.—A tree with evergreen coriaceous leaves, obliquely ovate, acuminate, crenate-serrate, 3 nerved to below the tip, cymes short, flowers on short pedicels, drupes racemed, narrowed to the tip. The wood, which has a disgusting odor, is used in fumigation at child-birth. Internally it is taken in combination with other medicines in cases of cutaneous diseases.

Cissampelos pareira, Linné. (Diyamitta). N. O. Menispermaceæ.—A climbing shrub, with orbicular, reniform, or cordate leaves. It grows in tropical and sub-tropical India from Sindh and the Punjab to Ceylon and Singapore. The whole plant is said to cure ulcers. The roots are employed in fever and diarrhœa.

Coscinium fenestratum, Colebrooke (Weni-wel) N. O. Menispermaceæ.—A climbing shrub, young shoots, hoary-tomentose; leaves oblong, deltoid, glabrous above, hoary and reticulate beneath. Flowers green, heads umbelled. The woody stem is considered to be an excellent stomachic, and is a popular remedy in fevers. It also promotes appetite and is used in bloodshot eyes.

Cratæva Roxburghii, now C. religiosa. var. Roxburghii. (Lunuwarana).

N. O. Capparideæ.—A tree with 3-foliate leaves, the latter small, ovate, lanceolate, abruptly acuminate, berry globose. The leaves are employed as a remedy for gouty swellings. The bark is used as an appetizer and in diseases of the urinary organs.

Crotalaria laburnifolia, Linné. (Yakberiya) N. O. Leguminosæ.—A low shrub with slender, elongated, terete branches; leaflets, ovate-oblong, acute, membranous, glabrous, 1–2 inches long, cuneate at the base. Racemes, terminal and lateral, corolla large, bright yellow, much exserted. Pod 1½–2 inches long. The whole plant is employed for diseases of the gums and sore throat, and externally for sores and eruptions.

Curcuma longa, (Kaha) N. O. Scitamineæ.—This rhizome and its powder are well known. In Ceylon it is employed in skin diseases and also as a cooling wash in ophthalmia.

Cyclea burmanni, Miers. (Kehipittan) N. O. Menispermaceæ.—A climbing shrub with peltate leaves, latter thin, coriaceous; panicles equalling or exceeding the leaves, many flowered and pubescent. In Ceylon *Cyclea burmanni* ascends to 2,600 feet. The whole plant is used for catarrhal fever, cough and asthma.

Cyperus rotundus, Linné. (Kalandura), N. O. Cyperaceæ.—The rhizome is used in fever, diarrhœa, dyspepsia and stomachic complaints. It is also considered to be diaphoretic.

Desmodium triflorum, D. C. (Hin-undu-pinyali), N. O. Leguminosæ.—A trailing herb, stems cæspitose, very slender, trailing, copiously branched, clothed with fine, spreading hairs. Flowers 1–3, together without a common peduncle, in the axils of the leaves. Pod 3–5 jointed, pubescent. It is used in cases of fever caused by catarrh.

Dipterocarpus zeylanicus, Thwaites (Hora), N. O. Dipterocarpeæ.—A lofty tree, young branches compressed and glabrous, flowers in a raceme, petals blood red with pale yellow margins; fruit, a nut densely canescent, The resin is used in the devil ceremonies, and the leaves and bark to reduce the swelling of the joints of cattle caused by overwork. It will be remembered that a number of species of Dipterocarpus, indigenous to the East, yield *gurjun balsam*, or wood oil.

Drega voubilis, Benth. (Kirianguna), N. O. Asclepiadaceæ.—A stout, tall climber, branches often pustular. Leaves ovate, sub-orbicular or cordate acuminate, rather coriaceous. Peduncles slender, umbels drooping, stigma dome-shaped. Follicles ¾ x 1½ inches, broadly lanceolate, turgid, glabrous. Given in mild fever to children and also to women after child-birth to improve the secretion of milk. It is also said to cure asthma.

Eclipta erecta, Lamk. (Kikirindi), N. O. Compositæ.—This is now *E. alba*, Hassk. It is a strigose hirsute annual; leaves sessile, linear or oblong, lanceolate, narrowed at both ends. Heads small, axillary in terminal peduncles. Cosmopolitan in warmer climates. Like *Wedelia calandulacea* (Ran-wan-kikirindi), it is used to purify the blood, to cure cutaneous diseases and to cool the head.

Eleusine indica, Gærtn. (Walkurrakan, Belatana), N. O. Gramineæ. This grass, naturalized from India and now so common, especially in Southern United States, known as "dog's-tail" or "wire-grass," is reputed in the Sinhalese Materia Medica to be useful in sprains and dislocations.

Epaltes divaricata, Cass. (Hinmudamahana) N. O. Compositæ. A glabrous

annual, 4–8 inches high, branched from the base; branches divaricate, winged; leaves, linear, lanceolate; heads in winged peduncles, when ripe dull purplish, with the involucral tracts almost pungent. It is a bitter and astringent tonic. It promotes digestion, cures bleeding piles and destroys intestinal worms. Also employed with benefit, it is said, in diseases of the urinary organs.

Evolulus alsinoides, Wall. (Vesnu-kranti) N. O. Convolvulaceæ. This is now placed under *Breweria evolvuloides*, Chois. A very much branched, rough, small shrub, with a few scattered strigose hairs. Leaves, oblong, small; flowers, small, axillary 1–3 together, whitish or pinkish; capsule sub-globular, 4 valved; seeds, glabrous. The whole plant is employed as a tonic and appetizer; it is a pleasant bitter and also used in mild cases of fever.

Ficus altissima, Blume (Nuga) N. O. Urticaceæ. A large spreading tree, with few aërial roots, young parts puberulous; leaves coriaceous, petioled, broadly ovate-elliptic, base rounded, never cordate, 3-5 nerved; receptacles sessile, axillary, in pairs, enveloped when young, early deciduous, calyptriform bracts ovoid, smooth, when ripe ¾–1 inch long; the 3 yellowish basal bracts, broad, yellow, obtuse, united at the base, pubescent or puberulous. It is used as a wash for ulcers and internally to check diarrhœa.

Gmelina asiatica, Linné. (Demata) N. O. Verbenaceæ. A shrub spinescent or unarmed; leaves entire or coarsely lobed, beneath glaucescent from a close coat of minute glands. Racemes terminal. The bark is employed in bilious fever and in indigestion attended with pains.

Hedyotis avicularia, Linné. (Geta-kola) N. O. Rubiaceæ. Herb, branched; leaves, usually pale green, when dry, 1–3 inches long; cymes, axillary, sessile, small, very dense flowered; calyx teeth variable. "Some Ceylon specimens have leaves with petiole ½ inch long and long caudate points as in Beddome's figure" (J. D. Hooker). Used for cooling the bowels and in cutaneous diseases.

Hedyotis vestita Br. (Pita-endu-pala) N. O. Rubiaceæ. A stout herb, 1–2 feet long, branches terete; leaves, 2–4 inches long, greenish when dry; cymes inconspicuous; fruit minute. It is used in nervous diseases and intermittent fever. Considered also to be a blood purifier.

Hemidesmus indicus, *Br.* (Iramusu) N. O. Asclepiadaceæ. It is a twining shrub, leaves opposite, hoary beneath and variable in form; corolla, green without, purple within; follicle, 4–5 inches. The root is used to purify the blood, promote appetite, cure skin diseases and syphilis. It is called native sarsaparilla. It was introduced into England, and the syrup like that of sarsaparilla is there used as a flavoring in medicine.

Herpestris monniera, H. B. & K. (Lunuvila) N. O. Scrophulariaceæ. A creeping herb, quite glabrous, rather succulent: branches, 4–10 inches long. The whole plant is a mild purgative; it is also used as a fomentation for erysipelas and elephantiasis.

Hydrocotyle javanica Thunb. (Maha-gotu-kola) N. O. Umbelliferæ. A prostrate herb rooting at the nodes; fruit 1-10 inch, much compressed, obicular, lateral primary ridges commissural, intermediate, faint or none, pericarp, hard and thin. This plant is common in the mountains of Ceylon. This, like H. asiatica L. (Hin-gotu-kola) is said to be a good tonic, and is given to children chiefly for bowel complaints. It purifies the blood, checks slight dysentery and promotes digestion; it also cures nervousness and skin diseases, and

is a reputed cure for offensive breath. *H. asiatica*, it will be remembered, was the plant that was incorrectly reported about forty years ago as being efficacious in leprosy.

Ipomœa beladambae Roem. and Sch. (Bimtamburu). N. O. Convolvulaceæ. An extensively trailing plant of Ceylon, abundant in damp fields. An oil obtained from this species is said to check giddiness and to keep the head cool.

Ixora coccinea, Linné. (Ratambala) N. O. Rubiaceæ. A branching shrub; leaves coriaceous, pale when dry, stipules with rigid cusps. Cymes rarely short peduncled; ramifications very short, articulate; bracts and bracteoles imbricate; flowers scarlet, sessile or very shortly petioled. Filaments long and anthers short for the genus. Stigma with short, revolute arms. "It is common in Ceylon, ascending to 2,000 feet" (Thwaites). The flowers and the bark are used for bloodshot eyes and the leaves for sores and ulcers. A tincture of the root of this plant, it will be remembered, was compared with ipecac as an antidysenteric.

Kagia montana (Welkahambiliya). This plant is employed in cases of mild fever in children caused by bowel complaints.

Leucas zeylanica Br. (Getakumba) N. O. Labiatæ. An erect annual, hispidly hairy or pubescent; leaves 2-3 inches long, shortly petioled, linear or elliptic or lanceolate, obtuse, subserrate whorls subterminal, many flowered. Common in Ceylon. Used in dog bite and in mild fever caused by indigestion; also to relieve pain caused by intestinal worms.

Melia azadirachta (see *Azadirachta indica*).

Mimosa intsia. Linné. (now *Acacia intsia* Willd). (Eliddikumba.) N. O. Leguminosæ. A tree with minute hooked prickles, bractlets and leaf rhachises finely, downy or glabrous, the latter with a gland at the base between the 2-3 upper pinnæ; leaflets minutely cuspidate; peduncles finely downy, heads yellow; pod 4-6 inches long, straight, strap-shaped, glabrous, dehiscent. It is employed for cobra bite. A curious property that it is said to possess, is that if the plant be chewed when anything falls into the eye, it is believed that the foreign body will be removed.

Oroxylum indicum, Vent. (Totila) N. O. Bignoniaceæ—A glabrous tree with a thick bark; leaves opposite, large two or three times pinnate; leaflets ovate, entire, peduncle very thick; raceme ten inches; capsule 1-3 feet by 2-3¼ inches thick, margins somewhat incurved, valves woody. The bark is employed as a bitter tonic. It reduces rheumatic swellings, dispels phlegm, and checks diarrhœa, dysentery and fever.

Tinospora cordifolia Miers (Rasa-kinda) N. O. Menispermaceæ—A climbing shrub, bark corky, shoots glabrous; leaves cordate, glabrous; racemes exceeding the leaves; drupes size of cherry and red. The stem is employed in fever, skin diseases, jaundice, rheumatism and sympathetic affections, and is considered to be a valuable tonic.

Wedelia calandulacea (see under *Eclipta erecta*.)

THE APOCYNACEÆ IN MATERIA MEDICA.

By George M. Beringer.

(*Continued from page 449*).

Botanical Geography.—Tropical Africa is the principal centre. Oriental and meridional Asia contains likewise many species, but on the contrary, neither to America nor Oceanica can be referred a single specimen. The area of dispersion for each species is quite limited. It is thus, for example, that the S. hispidus (if we admit the S. Kombe as a variety) and the S. sarmentosus are the two single species that occupy in Africa a vast region. It is well, nevertheless, to make some reserves on this subject, as new explorations will largely extend the area actually restricted to certain species. In Africa, Strophanthus extends from 16° North to 33° South, and from the one side to the other. But the Eastern side being less explored than elsewhere, does not offer but a few types, which are certainly like, if not possibly only forms of, the Western species (Kombe, Petersianus, etc.). We find these Strophanthus from Zanzibar as far as the Zambesi. Upon the side opposite, the number of the species and their extension are very large. Existing at the Senegal, on the north, we find them nearly as far as the extreme south. But the true region of the African Strophanthus extends from Cameroun to Angola, from 5° North to 10° South. We find these in a zone of the coast of which the limit towards the interior of the country is hard to trace, yet, nevertheless, this limit exists. It is in Africa that we find the species of interest to medicine.

In Asia and in Malaysia (some of the Malay Islands contain Strophanthus), the limits indicated are 22° N. (possibly 26°, if the S. Wallichii exists in the Khasyá Mountains), and 9° S. and 70° to 124° longitude. Here again of seven species two only extend in one area.

Botany.—The Strophanthus are probably all sarmentose, inhabiting the low grounds, generally in the neighborhood of the large trees, upon which their branches cling after making frequently upon the ground an arch appearing like the rolled, twisted body of a gigantic serpent. The branches extend from bough to bough, leaving, hanging down, wide apart, their fruits, whose diverging carpels resemble great horns, giving to the whole a strange appearance.

The *roots* which we know (six or seven species) are fleshy and

strangulated at distant points. The *branches* are sometimes quite large, with lenticels in the young state. *Leaves* opposite, rarely verticillate, with venation varying, serving for their classification. Upon all of the ærial parts exist occasionally hairs, at times very fine, at other times large, rigid, with a persistent bulb at the base; color varying, ordinarily a russet. Regarding the *flower*, the differences in the length and the consistence of the calyx, the length of the prolongations of the corolla, the form of the ligulary lobes and the appendices of the connectives, are the characters the most important to consider for distinguishing the species.

Fruit.—It is always formed of two ligneous follicles, more or less cylindrical or fusiform, sometimes lengthily attenuated, at other times terminating quite abruptly and the size very various, often attaining 0·5 m. (*hispidus*). The two carpels diverging at the proper time and united solely by their base. They form with each other an obtuse angle, or the one being horizontal, form even an angle turned to the rear (*S. divaricatus*). The summit sometimes bears the modified stigma (*S. hispidus*). The base is obtuse, notched toward the insertion of the peduncle.

Externally, the fruit shows an epicarp of a deep reddish-brown or blackish-brown color. The surface sometimes a little villous, frequently strongly wrinkled longitudinally by the drying, and in the majority of the species, numerous lenticels. At maturity, the fruit opens often by a long line longitudinally, the borders of the carpel leaves turning back, separating little by little and leaving the seeds escape. The placenta is formed by two plates which are coalesced, then separate in the same way as the fruit, and describe a curve parallel to the external face of the carpel. The placenta is yellowish and more or less papyraceous.

The endocarp is constituted by a tough plate, yellowish, smooth, which ordinarily easily separates from the exterior region. The natives generally remove the epicarp, and the fruit is then reduced to an endocarp containing the seeds.

Anatomically, the pericarp presents an analogous structure nearly everywhere, the external region is rich in fascicles, some vessels, the most part fibres, surrounded by a network of cells in which are the laticiferous vessels, ordinarily filled with a colored substance. The endocarp is entirely sclerotic.

Seed is formed of two parts, the seed or grain proper and the

awn. They are always very numerous in the follicle, ascending, with a micropyle on the outside. From the base, the furrow runs the half way up the ventral face, inserting itself in the funiculus which crosses the yellow membrane covering the placenta and which breaks off close to the seed the moment of the dehiscence of the fruit.

The *seed* proper varies in the dimensions, form, color, surface and the anatomical structure. The length is always greater than the breadth, and does not exceed but little over two millimetres. The thickness likewise varies greatly, as also the attenuation toward the extremities. The shape varies within certain limits by the position or insertion of the seed in the follicle. The dorsal face is often more strongly convex than the other. On the ventral face toward the upper part one sees ordinarily the point of insertion of the funiculus (*hilum*), and in several species a raphe more or less clear. The color varies from a greenish-white or yellowish to a dark brown, and is often modified by the hairy covering. In some fruits, dried by fire, the extremities become charred and the color of the seeds changed. The seeds are distinguished as those *glabrous* and those *villous*.

Glabrous Seeds.—To this group belong all the Asiatic species and also the rarer African species. Franchet remarks that the absence of hairs upon the seed seems in correlation with a considerable development of the thread which surmounts the anther, and with an awn in which the naked part is shorter than the other. It is likewise noteworthy that Ouabaine is extracted from a glabrous seed and Strophanthine from a villous seed.

Villous Seeds.—The hairs on the surface of these seeds are ordinarily short. S. laineux, of Zambesi, being the sole exception to this rule. They are applied close to the seed and directed from the base to the top. The color varies, but quite constant for the same species. The lustre is silky and brilliant. Fontaine says that the hairs detach themselves very easily in handling and strongly irritate the mucous membranes of the nostrils and the conjunctiva. The seeds of Strophanthus bear two awns; the one at the base sessile, the other at the summit, more or less lengthily aristated. The first is very caducous, and not being observed by some botanists on this account, its existence has been doubted. The upper awn is always greatly developed and forms a straight shaft, rigid and

fragile, of which the inferior part is naked and the upper adorned with long hairs, fine and delicate.

The hairs of the seed and of the awn are alike, excepting the length of the latter, unicellular, and with one long canal running through, ordinarily filled with air. Those of the surface slightly enlarged at the base.

The anatomical structure of the seed is fully described under each species. It is especially important to be well acquainted with the external tegument, because the thickening of the lateral walls of the cells vary in form and characterize the species. The second tegument with a larger number of layers of cells, but ordinarily very flattened, brown and difficult to distinguish, is likewise important. Beneath these is the albumen, relatively greatly reduced and enclosing the embryo. The albumen consists of cells with rather thick walls and contains the oil. The embryo is formed of slender cells, between the two epiderms of the cotyledons. It contains numerous droplets of oil and sometimes crystals of calcium oxalate in macles. Between the albumen and the embryo is a sort of loose tissue, pointed out by Blondel. Finally, numerous laticiferous vessels are near the cotyledonary fascicles and even in the seminal tegument. Starch is very rarely abundant and often absent. The embryo and the albumen contain especially the active principle.

It is generally said that the seeds of Strophanthus are inodorous; they are very little odorous in the ordinary condition, but if crushed they exhale a peculiar odor, slightly poisonous, and on contusing in a mortar, one feels quite an irritation of the mucous membranes. The taste is atrociously bitter in the best sorts.

The researches of Fraser, Hanauseck, Helbing and Hartwich on the microchemical characters, permit the recognition of the presence of strophanthine in the seed, and consequently, to estimate rapidly their value. The reaction the most interesting is that given by concentrated sulphuric acid. Helbing proposed to moisten the section with a trace of solution of ferric chloride, then to add one drop of the acid. Sulphuric acid in contact with a trace of Strophanthine gives with this a green coloration, which, according to Fraser, changes in five minutes to a greenish yellow and finally gradually turns to a brownish green from the centre to the periphery in twenty minutes, or from a greenish gray to a dirty brown in one or two hours. Hanauseck described the color reactions of the various parts

of the seed, and concluded wrongly that the embryo contained the fatty oil and the strophanthine, while the albumen contained but the oil. In the good kinds, the albumen gives almost immediately a bright green (occasionally at first blue), the cotyledons a green very much less intense. Then the color passes from a bluish to a red, and finally, paling gradually to a gray with greenish streaks, etc. In the poorer kinds, the albumen gives a green and the embryo becomes green solely in or under the epidermis or around the fascicles, and it is the laticiferous vessels which become so colored. In other sorts, neither the embryo nor the albumen become green, but a red, or sometimes a yellow or brown, due to the action of the acid upon the oil or aleurone. This reaction may be utilized for distinguishing products in appearance very similar.

Hartwich also notes a remarkable relation between the presence of calcium oxalate and that of Strophanthine, which it seems to exclude. In two sorts alone neither are seen, in one only (and which everywhere appears very peculiar by its characters), is found constantly the coexistence of small isolated crystals of oxalate with a trace of Strophanthine. Throughout the others macles of oxalate are abundant in the embryos destitute of Strophanthine.

Strophanthus hispidus, A. P. D. C., *the Strophanthus hirta*, Poir.

This is the species which for a long time, and wrongly, was given in Europe the name of *Inee*. The geographic distribution of S. hispidus is really very great, because it must probably be admitted that the S. Kombe is one form of S. hispidus, and Blondel shows that these modifications of the type resembling a variety extend little by little to the West and to the East across the African Continent. But, in materia medica, it is important to distinguish these two forms, not solely by their morphological and chemical characters, but also by their habitat. The limit of the species is from the Cayor, near St. Louis, as far as the back of the Gulf of Guinea, near the Old Calabar River. We may not affirm at present that the plant extends much towards the interior of the country. It seems, however, to meet with the S. Kombe in the Nyanza region. Botanically, it is a sarmentose bush, with the branches trailing. It inhabits the ditches or the moist parts always near the large trees. The young branches are covered everywhere, but especially upon the inflorescences and the leaves, with rigid hairs, yellowish-white and with a bulbiform

base. The flowers are accompanied by bracts; they are said to be white on the exterior; yellow with streaks of purple on the interior. The segments of the hairy calyx are linear, and their lobes attain to or even exceed the border of the tube of the corolla. This information becomes necessary at least for the comparison with S. Kombe.

The *fruits* in the fresh state are formed of two follicles very divergent at maturity. The shape is much elongated, attenuated to a point at the extremity, with an irregular cupuliform stigma terminal. The surface is a dark green. A transverse section of the carpellary leaf shows that the margins of the leaf are coalesced on a level with the ventral suture of the carpel; these extend in the interior nearly as far as the mid vein, then divert in an arc to each side, forming thus a vast placentary surface upon which nearly 200 seeds are emplanted by their funicules, which cross, before it arrives at the ovule, a thin yellow membrane, covering the placentas.

The fruit arrives at maturity about July; in September, the desiccation finished, the fruit falls to the ground and the wind disperses the seeds. The dehiscence is along the ventral suture. The fruit is hard, ligneous and resistent. The length varies greatly. When well developed and preserved with the attenuated upper extremity, which is frequently broken off, it attains a length of 50 centimetres, at other times hardly one-half. The shape is generally a very elongated spindle, much inflated about the middle if the dehiscence is much advanced. The upper extremity attenuated lengthily and terminated by a small, irregular, stigmatic plate with sinous border. The lower extremity is strongly notched toward the insertion of the peduncle and the indenting is ordinarily bordered by a rugose ridge quite marked. The cleft is longitudinal and ventral, very long and extends little by little, and finishes by separating and spreading completely the carpels at the base but not at the summit. At the time spread, the carpels attain 4 centimetres in breadth, and about 1½ centimetres in diameter.

The external surface is strongly wrinkled lengthwise by the drying, the color is blackish-brown, often deeply and sometimes a little greyish or reddish, always dull; the striations in series and quite fine. The lenticels are ordinarily very numerous, the form rounded, the color dirty white or russet, about the base brown. The surface of the fruit is entirely glabrous. The dehiscence commences at the mo-

ment of plucking, but if the fruit is maintained firmly bound with a band during desiccation, the ventral face shows a simple cleft, long, and straight, fixed by the placentary plates which it separates. The seeds are completely concealed, but the more often the suture enlarges leaving exposed the contents. The placental plate is thin, fragile, papyraceous, color dirty-white or yellowish-white or pale-yellow, smooth and shining upon the internal face, dull toward the exterior, or it is covered with a fine yellow membrane ordinarily not adherent. This is very easily detached from the ligneous part of the fruit, and is often cut in slender strips. The margins of the carpels are then bevelled and slightly turned inward. The internal face of the pericarp deprived of the seeds is entirely different, the color much more clear, brownish to greenish-yellow, it is glossy, satiny and to the touch soapy; it is smooth and very uniform.

Upon a transverse section of the pericarp we perceive two regions very unequal; the external much thicker, is brown, a little deeper towards the exterior, marked by white points quite easily seen. The internal, very thin but very tough, is yellowish, more clearly distinct than the other, from which it is easily separated. In commerce, the fruits are often reduced to this internal layer.

Structure of the Pericarp.—The *external zone*, thick and brown, is constituted by a parenchyma of irregular cells, upon section, very flattened, sinuous, containing the brown coloring matter. In this tissue we find:

(1) The fibro-vascular fascicles.

(2) The fascicles of long fibres, yellowish-white, very strongly sclerified, with linear lumen.

(3) Abundant laticiferous vessels with a colored juice, more or less red, with thin walls, a sinuous passage.

The *internal zone*, yellow, brittle and thin, is formed of sclerotic elements, very difficult to cut; the fibres which constitute this are disposed in two directions; the external (1 or 2 layers) longitudinally, the internal transversely, these last somewhat entangled. The placental plates are proportionately richer in fibres and poorer in parenchyma. The placentas present only the longitudinal fibres, the external side from which departs the funicules, with tracheæ and laticiferous vessels, and on the internal side the membrane is limited by one layer of very large fibres. The thin membrane which covers the placentas with two cellular planes, with here and

there solely a little intermediary parenchyma; the external zone accompanies the funicules in their "sortie," it is then formed of irregular cells.

DESCRIPTION OF THE SEED.—The shape is always lanceolate, but occasionally asymetrical, often with margins a little distorted, always attenuated lengthwise in advance, and often quite pointed in the rear; but this lower extremity is subjected to variations rather great in the same fruit, and the seeds are abundantly rounded. The size fluctuates from 10–17 millimetres in length by 2–3 millimetres in breadth and 1–1·5 millimetres in thickness. The size not only varies, but also the proportion, certain seeds being relatively broad and flat in comparison with their length.

The *raphe* always little or not at all visible excepting sometimes entirely at the top. The *hairs* very numerous, not very near together, color a golden brown, brilliant, velvety, changing in color with the illumination, short but visible to the naked eye, direction from base to the top. The passage from the seed to the awn is badly limited. The awn is relatively long, the part naked at times very straight, at other times and often a little sinuous, always very fragile, quite dark in color, and varying from 15–18 millimetres to about 28 or 30 millimetres. The plumed part about 25–28, 30 to 35 millimetres, it being a little longer.

The hairs of the awn are very long and frequently attain 5 centimetres; they are spreading, silky, fine, delicate, brilliant, whitish, with the base slightly yellowish; in mass a little yellowish.

On macerating the seed in water, we may separate (1) the seminal envelope, thin, colored, villous; (2) the whitish albumen, cartilaginous, resistant, in the form of a sac, quite transparent, appearing to be laid around the embryo; (3) the white embryo friable with two oval cotyledons, with a long and slender radicle.

ANATOMICAL STRUCTURE.—(*a*) *Tegument.*—The first cellular layer is formed of cells with thickened membrane especially following the lateral walls, each cell becoming circular by a thickening parallel to the external surface. Upon the section, these thickenings coalesce the two neighboring cells appearing as a convex lens, quite clear, yellowish, with a vertical line of separation. Between these solid lateral walls the upper face of the cell is ordinarily depressed, so that the cellular zone is undulated and as if lifted between pillars. Viewed from the face this layer is formed of cells more or less quad-

rangular, a little elongated, with thickened walls and quite wavy. The hairs of the seed start from this zone, they are very small, short, unicellular and extremely fine. With the microscope they appear nearly colorless, while the cell wall is colored a yellow-brown.

Beneath is a zone formed of cells very strongly flattened and little visible unless swollen a little by reagents. These elements are elongated upon the section parallel to the surface. The contents are brownish and the cell walls are thin and colored.

(*b*) *The albumen*, with polyhedral cells, quite irregular, with thick walls; the first layer under the seminal tegument is more regular. The last with its external walls much thickened. In these cells are the droplets of oil. Between the albumen and the embryo we see also that which was pointed out by Blondel, some tracings of cells.

(*c*) *The embryo* presents nothing special; it is nearly analogous in all the Strophanthus. It does not contain any oxalate.

Placed in contact with concentrated sulphuric acid, the albumen and the embryo act with a little difference, which proves at times the more the inequality in value of the seeds according to the origin, and the probability that the forms or the species are multiplied under a single name. In the most of these seeds, the green coloration is produced very rapidly, at other times much more slowly. The color is very deep green throughout, nearly black. This changes quickly to a coloration rather varied, but ordinarily violet or violet-red, sometimes yellow. The embryo becomes colored green more slowly than the albumen, less strongly and sometimes hardly at all. The final color is also violet or blue. Generally, at the end of a few minutes, the entire section is violet.

STROPHANTHUS MINOR.

Strophanthus Minor Pax. *Strophanthus* of the *Niger* Blondel. There arrived in England under the name of S. hispidus or under that of Strophanthus from the Niger numerous mixtures in which one could distinguish: The true hispidus, a nearly related form, but different, for which Blondel retained the name of *Strophanthus of the Niger*; a third sort discovered later and named by Blondel *S. minor*, and from our present knowledge we suppose that these mixtures are still more complex. However, Pax, Franchet,

etc., reunited *S. niger* and *S. minor*, and founded a species probably near to *S. hispidus*, but upon which the botanical information is faulty (we know but the fruit and the seeds only). It also approaches *S. sarmentorus*, and specimens examined by the author are considered far from proving that *S. Niger* was a synonym for *S. Minor;* further botanical research in this mysterious region of the Niger may possibly show two or even more species. This, or these, species approach the S. hispidus and inhabit the same regions. In the type of *S. Niger* Blondel the follicles are very strict, measuring nearly 15 millimetres in diameter, 32 centimetres in length, or even more, the extremity being broken off. Externally, color brown, quite clear, but the fruit was incompletely scraped. According to Blondel, the parts not scraped are a dirty earthy gray or reddish. The pericarp of *S. Niger* Blondel offers some anatomical differences from the *hispidus:* in the fibrous zone, the cells of the parenchyma are less compressed and laticiferous vessels are more localized about the vascular fascicles, and these, here, are much developed. The fibres are less numerous and with very large lumen. In the elastic zone the dimensions of the fibres are larger, and in the external longitudinal layer are much thicker than the internal. The most constant difference between these seeds and those of the *hispidus* is, perhaps, the proportion between the naked part and the plumed part of the awn, the first becomes here quite sensibly larger than the second, and it is questionable if this shaft is removed (as often is the case in commerce), if the distinction is possible. It is true that the size is smaller in the form known as *minor* (8–14 millimetres in length), but it is larger in the form *Niger*, and has much the covering and the size of seeds of the S. hispidus. The raphe is here more visible than in the hispidus, and extends over two-thirds of the seed. The hairs of the seed are quite similar, but are possibly less hard and fall very easily. The color of the surface is a brown, at times light, at other times deep, nearly violet. When the seed is of a certain size, the hairs being broken, the raphe easily seen and the color light, the confusion with *S. glaber* of Gaboon becomes possible. The form plano-convex indicates, however, that it is remote. The more rounded shape of the base will not serve, because many of the seeds of S. hispidus are likewise rounded. The single point that may be brought forward is the relative breadth of the seed compared with its length; the seed of the *minor* is broader

and much flatter, rather oval than truly lanceolate. Another distinction is established upon the fracture, the taste and the anatomical structure.

The perisperm is very thin, the albumen strongly cartilaginous and transparent, the embryo with thick cotyledons, white, opaque, with a long radicle. The shaft is pale yellow. In a specimen from Holmes, labelled S. from the Gold Coast, S. minor Blondel (?) its tendency is to split longitudinally from the summit to the base. Concentrated sulphuric acid placed in contact with the seed of the specimen from M. Blondel comports itself nearly as with the S. hispidus; the albumen is colored green, gradually very deep, nearly black; the embryo only a little more slowly, some parts more deeply colored indicate the regions of the fascicles. The color changes gradually to a violet. In the specimen from Holmes the coloration is not shown; it gives only a yellowish tint, then a rose. This seed is rich in oxalate.

[*To be Continued.*]

AN OLD BUT FLOURISHING BLUNDER IN MEDICAL CHEMISTRY.*

By Chas. W. Folkard.

"Lithic urate is more soluble than any other of these salts (the urates). Hence, lithia water is occasionally prescribed to gouty patients and to others who suffer from a superabundance of uric acid." . . . .

The above is an extract from p. 773, Part III, of Miller's "Elements of Chemistry," fourth edition, published in 1869, and there is sufficient semblance of truth in it to mislead those who are able to devote but a few months to the study of chemistry, as is the case with the majority of medical students.

Although the paragraph quoted was omitted in the new edition published in 1880, it would seem that no attention was called to the subject, for sufferers from a too abundant secretion of uric acid have been treated up to the present time on an erroneous assumption, proceeding from the "little knowledge" which is admittedly so

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* From *Chemical News*, **70**, 99.

dangerous, and which is also doubtless responsible for the practice of exhibiting chlorate of potash in cases of blood-poisoning, "to oxidize and destroy the poison in the blood," whereas every chemist is aware that in an alkaline solution like the blood the chlorate of potassium is practically as stable and inert* as the chloride, or as common salt.

In these remarks the writer disclaims the idea of censuring the members of the medical profession, because these are chemical subjects, and if blame be due anywhere it must undoubtedly fall upon chemists for neglecting to point out to the members of an allied profession the absurdities involved in these two cases.

There is, however, one great consolation for the uric acid and pyæmia patients who have been wrongly treated, viz.: that both lithia water and chlorate of potash* are (so far as we know) harmless—quite unlike the copious blood-letting and salivation treatments of a by-gone age.

At the same time it must be remembered that the use of valueless "remedies," however harmless in themselves, hinders or altogether prevents the search for real and rational ones. The sooner, therefore, attention is drawn to them the better for the patients, even should there be nothing to propose in lieu of those discarded.

Although the absurdity of the lithia water "bull" merely requires to be mentioned to a trained chemist to be at once recognized, it may be as well to give a few details.

In the first place, the substitution of lithium for sodium in the animal economy would probably be by no means an unimportant change. Physiologists have found that the substitution of the blood of one animal for that of another is possible in the case of allied species, but in that of animals belonging to different genera the change may be followed by immediate death. In all probability, therefore, it would be a very risky proceeding to convert the albuminate of sodium in human blood into albuminate of lithium, even if it were possible. Fortunately for the patient, however, this is as likely to be successful as the notion regarding the medicinal use of free phosphorus, viz.: "the brain contains free phosphorus, and the

* While it is true that potassium chlorate is stable in alkaline solutions, yet it must not be forgotten that in doses of ten to fifteen grams it is an irritant poison.—*Editor of* Am. Jour. Ph.

more brain-work the more of that element is excreted. Therefore, to restore brain waste, give phosphorus pills." Such a crudity as this would be scouted, even as regards the mineral kingdom, *e. g.*, in the simple—or comparatively simple—operations of metallurgy.

In the second place, the question of quantity may be considered. As a bottle of lithia water contains about five grains of lithia, it is chemically equivalent to about ten grains of soda.

The quantity of blood in an adult being about 100,000 grains, and containing about 294 grains of chloride of sodium, equivalent to about 156 grains of soda, it would evidently require fifteen or sixteen bottles of lithia water to replace the soda by lithia, supposing that sodium salts were absent from the food.

From the quantity and composition of the urine, however, we know that about 140 grains of common salt, equivalent to about seventy-five grains of soda, are excreted every twenty-four hours, derived, of course, from the food. It follows, therefore, that from seven to eight bottles of lithia water would be required every day for the sole purpose of dealing with the sodium salts introduced in the food.

These results are conclusive as to the value of the present practice.

To the chemist, however, the above figures are superfluous. He knows that the tendency is towards the formation of the more insoluble, not of the more soluble, compounds; and that for lithia to be of any service in avoiding deposition of urates in the joints or bladder, all bases which form compounds with uric acid of less solubility than lithic urate (potassium, sodium, ammonium) must be absent.

If we have a solution containing a phosphate, a magnesium salt and free ammonia, we know that in a longer or shorter time a precipitate of ammonio-magnesic phosphate will take place, and the only way to prevent it is to ensure the absence of one of the constituents of the precipitate. We cannot argue "phosphate of potassium is more soluble than ammonio-magnesic phosphate, so by adding a salt of potassium to the solution we shall prevent the formation of the very sparingly soluble magnesium compound," and yet that is the assumption with regard to the medicinal use of lithia water.

It is a chemical exemplification of the truth of the old proverb about one man being able to lead a horse to the water, etc. It would be extremely convenient as regards uric acid patients if lithia water could be made to act in this way, but the laws of chemical combination do not admit of it. The medical profession, therefore, must recognize the fact, and seek elsewhere for a remedy or palliative for their patients.

An analogous case occurred in the gas world, where gas engineers strove for many years to purify the gas from bisulphide of carbon vapor by means of sulphide of calcium; and, *at the same time*, endeavored to make the spent lime inodorous by converting it into carbonate before taking it out of the purifier. Here, again, it would have been very convenient if carbonate of calcium could have been induced to combine with carbon bisulphide, but it is hardly necessary to remark that the attempt was a failure.

Although it is a matter for regret that the science of therapeutics should be in such an elementary stage in the nineteenth century, still the physician is but in the same predicament as the chemist whose work lies in the vegetable and animal kingdoms. Take, for example, the apparently simple question of water analysis. The intellect of the civilized world for fifty years or more has been unable to devise a process (physical, chemical, microscopical or biological) which will enable the operator to say with certainty: "This water is wholesome." There are several processes which are capable of detecting a bad water, but in many cases this can be done by the senses alone, and so recourse must be had to indirect methods, such as ascertaining the mortality and sickness amongst the people who use the water, or examining the source as to the probabilities of pollution. Little wonder, then, that medical science is frequently baffled in the attempt to deal with the complex problems of human pathology. Mineral analysis is but child's play compared with the study of morbid actions taking place in closed vessels, suspended in another closed vessel, the walls of all of them being opaque.

There are a few pomegranates from California in the market, but evidently the growers of that state have not yet learned to raise this fruit successfully, as the specimens sent to the eastern markets are quite inferior in appearance and flavor to the imported ones.

EDITORIAL.

THE PATENT MEDICINE TRAFFIC.

The pharmacist of the present generation is paying the penalty for the sins of his predecessor. Under the stimulus of thirty-three and sometimes fifty per cent. profit this unskilled and often uneducated apothecary of several decades ago recommended patent medicines as the readiest means of supplying the demand frequently made by customers for a remedy for this or that ailment. In this way he helped the manufacturer to introduce his remedies, and gradually educated a certain class of the American public to use this form of medication.

Now, the manufacturer, by the liberal use of printers' ink, compels the unwilling pharmacist to hand out his wares at no profit, but rather in some cases at a slight loss.

Instead of pharmacists combining to maintain prices, has not the time come for them to form a league to discontinue the sale of patent medicines?

The manufacturer has always dreaded this action, and all of his "plans for relief" have been coupled with a requirement that the pharmacist should sell just what is called for.

It is difficult to foretell the result of such action, but it could not injure the pharmacist, since his revenue from that source has probably ceased forever.

The writer does not offer this plan as entirely new; the suggestion has been made before; but all other "plans" having failed, why should not this one be adopted as the last and only way out of the difficulty?

As it took years to educate the public to use patent medicines, so it will take years to right that error.

The patent medicine is a canker on the professions of pharmacy and medicine, and a curse to the community at large.

THE ALCOHOL TAX.

It was stated in the October number of this journal that the section on commercial interests at the meeting of the American Pharmaceutical Association decided to advise against removal of the tax on alcohol, except in those cases where its chemical character undergoes a change, as in the preparation of ether and chloral. This unaccountable action of the section looks so much like the entering wedge, whereby the manufacturer will get free alcohol, while the pharmacist will be compelled to continue to carry the burden, that so far as we have heard, it has met with the universal disapproval of pharmacists throughout the country.

At a recent meeting, held in the Philadelphia College of Pharmacy, and attended by a number of representative pharmacists of the city and vicinity, there was not a voice heard in support of the action of the American Association. Mr. Joseph W. England read a paper on *Tax-Free Alcohol*, which was recently published in the *Alumni Report*, and a committee was appointed to take such action as might be necessary to secure justice to the apothecary.

It is obvious to all but the dullest intellects, that the demands of justice can only be met by giving to the smallest user of alcohol, for medicinal and scientific purposes, the same privilege that is accorded the largest manufacturer.

THE AMERICAN PHARMACY FAIR.

We have recently received the official announcement of this undertaking, and can give it our hearty encouragement. It will be held in Mechanics Building, Boston, during May, 1895, and has been endorsed by a large number of prominent New England pharmacists.

This fair has been projected with the object of promoting the commercial and educational interests of pharmacy throughout the New England States.

The total area of floor space is six acres, and exhibitors will be granted a number of privileges.

Benjamin Johnson has been chosen General Manager and Permanent Chairman of Advisory Board, and D. A. O'Gorman has been selected Permanent Secretary. The Advisory Board is composed of such well-known men as Prof. E. L. Patch and Messrs. H. M. Whitney, Wm. F. Sawyer, S. A. D. Sheppard, F. H. Butler, Charles C. Williams, Henry Canning, G. W. Cobb, N. W. Stiles, J. Allen Rice, W. C. Durkee and Prof. W. L. Scoville. The office is at 3 Franklin Street, Boston, Mass.

REVIEWS AND BIBLIOGRAPHICAL NOTICES.

The Practice of Pharmacy. By Joseph P. Remington, Ph.M., F.C.S. Third edition, enlarged and thoroughly revised. J. B. Lippincott Company. Philadelphia, 1894.

From 1,080 pages in the first edition of this work it has now grown to 1,448 pages, and exceeds in size the earlier editions of the United States Dispensatory.

It is evident at a glance that an immense amount of labor has been bestowed on the preparation of this edition, following as it does the recent issue of the Pharmacopœia.

Among the noteworthy additions, that one of a "Glossary of Uncommon Names, Terms or Substances," is sure to be appreciated. We note with satisfaction a concise and systematic treatment of the new synthetic remedies; too much credit cannot be given to this feature, for it at once furnishes the pharmacist with desirable information about the composition, properties and dose of substances, concerning which information is often needed, and difficult to find.

The metric system has been adopted in the numerous working formulas, but it has been accompanied by the equivalents in fluid ounces, troy ounces, drachms and grains. Evidently the author did not see his way clear to arbitrarily ignore the old system, but we hope the time is not far distant when all scientific works will absolutely adopt the metric system.

Sixty pages of index complete this comprehensive volume, and serve to fulfil the claim made for it that it is the handbook of the pharmacist, the physician and the student.

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This last paper is especially creditable, and informs us that *Menispermum Canadense* is generally sold in that State when sarsaparilla is called for, and from its chemical constituents, as determined by Professor Maisch, we may safely assume that it is superior in medicinal value to the true sarsaparilla.

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MINUTES OF THE PHARMACEUTICAL MEETING.

PHILADELPHIA, October 16, 1894.

On motion, Mr. E. M. Boring was called to the chair. The minutes of the last meeting having been printed in June, their reading was dispensed with.

Messrs. H. O. Wilbur & Sons presented, through Mr. Tilton, one of our graduates, samples of nearly every commercial variety of cacao; it was from these samples that Professor Bastin made his study of the starches of the cacao, which was published in the August number of the JOURNAL OF PHARMACY. A sample of English oak bark, *Quercus robur*, was presented by Professor Trimble, and one of live oak bark, *Quercus virens*, from Mississippi, by Mr. E. D. Heine.

Mr. C. H. LaWall read a paper upon *Ointment of Mercuric Nitrate*, see p. 525. Inquiry was made as to the temperature which the mixture attains when the acid nitrate is added. Lard oil, it was thought, is by far the best material for making the ointment, but the frequent adulteration of this oil with cotton-seed oil makes it important to observe caution in purchasing a pure article. The experiments of Mr. LaWall were endorsed by Mr. L. F. Kebler, who thought it would be well to rely upon the nitrate of silver test for cotton-seed oil.

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It was inquired if there was any method of preventing the granular condition which is so common in this ointment as it becomes older; it was thought the best that could be done was to rub it up upon a slab with a muller before dispensing.

One member said that a preparation made with vaseline as the base was the nicest he had ever seen, and he had known it to be applied both by practitioners and others with the most satisfactory results.

The paper was referred to the Committee on Publication.

Mr. Joseph W. England read a paper on *Tax-Free Alcohol.*

The paper elicited a very lively discussion, and it was thought that the interests of the retail pharmacists had never been properly brought before the Government, that it was unworthy a government like our own to admit that the fraudulent use of tax-free alcohol could not be controlled. Other nations, notably England, France and Germany, were able to do so, and so could ours.

It was the sense of this meeting that a strong effort upon the part of the retail pharmacists throughout the entire land should be made, and that we should emphasize our opinions on this subject, that there was no class in the community who were so heavily burdened in proportion to their business ability to bear such taxation, and that the best of reasons, both ethical and commercial, made such an appeal for relief most important for us.

A series of resolutions were read by Mr. Robt. England, as follows:

WHEREAS, Alcohol enters so largely into the making of medicinal preparations, is at present of such excessive cost, due to the continuance of an internal revenue tax which results in making a product worth but 53 cents a gallon cost $2.50, and its lessened cost would be of great benefit to the public and the pharmacist alike; and

WHEREAS, Congress at its last session passed the Hoar Bill, making alcohol tax-free when used for manufacturing medicinal preparations, after regulations to be prescribed by the Secretary of the Treasury had been satisfactorily complied with; and

WHEREAS, These regulations have not been issued, and it is believed will not be, on the ground that the law is defective and that Congress has failed to provide sufficient funds to carry it into effect; therefore,

Resolved, That we, the Philadelphia College of Pharmacy in pharmaceutical meeting assembled, place ourselves on record as favoring tax-free alcohol for manufacturing medicinal preparations, believing that practicable regulations can be devised whereby the Government can be adequately protected against fraud, and pharmacists, and the public indirectly, be given the almost priceless boon of tax-free alcohol; and

Resolved, That we urge the pharmacists of Philadelphia and of the country at large, to earnestly appeal to their Congressional representatives to prevent, at their next session, the repeal of the law, to amend it if necessary, and to pass if needed, a sufficient appropriation to put it into effect; and,

Resolved, That these resolutions be entered in full upon the minutes of this meeting, and printed in the *American Journal of Pharmacy* and the *Alumni Report.*

G. M. Beringer seconded the resolutions, and said that according to the newspaper accounts the Secretary of the Treasury had conferred with representatives of the wholesale drug trade, the manufacturing pharmacists and the manufacturers of proprietaries, but not with the retail pharmacist. The American Pharmaceutical Association was generally supposed to voice the sentiments of the retail drug trade. In the past this association had repeatedly adopted resolutions in favor of tax-free alcohol for pharmaceutical purposes and had

memorialized Congress to grant the same. He was surprised to learn that at the recent meeting at Asheville, N. C., this same association had passed a resolution recommending the Secretary of the Treasury to so construe the law as not to admit of free alcohol being used for the purposes of the pharmacist. This action was not in harmony with their past labors, and the reason for such was beyond our comprehension, as it certainly did not correctly present the views of the retail pharmacists of America. Whatever the regulations that might be adopted, they should be so framed as to place the retail pharmacist, who purchased his alcohol in 10-gallon cans for the purpose of manufacturing pharmaceutical preparations, on the same level as the larger manufacturer who purchased alcohol by the carload. Any plan which would not include the smaller manufacturer would be manifestly unjust and the worst kind of class legislation.

The resolutions were then taken up and considered singly, and finally adopted as a whole.

It was moved and seconded that a committee of five be appointed to prepare a paper embodying our views, and have it sent to the druggists of the whole country, and that it be referred to the publications of the College.

The chair appointed

MR. G. M. BERINGER, *Chairman.*

RUSH P. MARSHALL, J. W. ENGLAND,
WM. MCINTYRE, ROBERT ENGLAND.

Professor Trimble called attention to an improvement in the microscope, made by our fellow-member, H. M. Wilder (see page 523), which consists of a revolving sub-stage, contrived to furnish four different kinds of illumination by the condenser, the dark back-ground, the polarizer and simple illumination.

The meeting then adjourned to visit in the Microscopical Laboratory.

T. S. WIEGAND, *Registrar.*

OBITUARY.

Jacob Hoch, Ph.G., Class of 1891, died at the residence of his sister, at the old Hoch Homestead, on the Easton Road, near Easton, Pa., on Saturday, September 22, 1894, of heart disease, in his 27th year. He received his early education in the public schools near Easton, Pa, and learned the drug business with Milton M. Buss, Ph.G., at South Bethlehem, Pa., remaining with him from 1886 to 1889; in the latter year he came to Philadelphia, and entered the employ of Wm. H. Lantz, corner Seventeenth and Columbia Avenue. He attended the Philadelphia College of Pharmacy in 1889, '90 and '91, and graduated with the Class of 1891. He entered into business for himself in April, 1893, at No. 3913 Lancaster Avenue, which he carried on successfully until a few days before his death, when he sold his store and was taken to the residence of his sister in Easton, Pa., on Tuesday, September 18th, and died suddenly with heart disease on Saturday, September 22d, although he had been suffering with consumption during the past year. He was a young man of good character, and had many friends both in his native place and in Philadelphia, who received the news of his death with much sorrow. He was a mem-

ber of the Alumni Association. His funeral took place from the residence of his sister, 1816 Butler Street, Easton, Pa., on Wednesday, September 26, 1894, and his remains were interred at Farmersville Cemetery.

Samuel S. Jones, Ph.G., Class of 1886, was born at Wilkes-Barre, Pa., June 16, 1864, and died in Rio Janeiro, Brazil, March 11, 1894, of yellow fever, aged twenty-nine years, eight months and twenty-three days. He received his early education in the public schools of his native city, and in early life began to learn the drug business with Mr. T. Jones, at Scranton, Pa., and also received instructions from Dr. Robitham, after which he entered the employ of Millard F. Cyphers, and remained with him until the fall of 1884, when he came to Philadelphia and matriculated in the Philadelphia College of Pharmacy as a Junior, and passed successful examinations both in his Junior and Senior years, and graduated with honor in the Class of 1886. His thesis was entitled *Xanthorriza apiifolia.* After his graduation he returned to Wilkes-Barre and entered the employ of Mat. Wolfe & Co., and for some years previous to his death was a member of that firm. He had gone to Buenos Ayres in November, 1893, and from there to Rio Janeiro, on his homeward journey, when he was taken with the dread disease, and was removed from his boarding-house to the hospital, where he died, and his remains were interred in that far-off land.

He was married June 3, 1891, and leaves a young widow, an aged father and mother, five sisters and two brothers, to mourn his early and sad death. He was of a genial nature, and made many friends while attending College, who will hear of his death with sorrow.

NOTES.

The difficulties in the cultivation of black pepper in the West Indies have been successfully overcome in Trinidad, as we learn from a Bulletin (No. 23) of the Royal Botanic Gardens. A crop of some 200 pounds has been harvested, and samples have received highly satisfactory valuation.—*Botanical Gazette.*

TANNIGEN.

This is the name of a new remedy described by Dr. Hans Meyer (*Pharm. Zeitung*, **39**, 568). Schiff in 1873 prepared a pentacetyl derivative of tannin, by heating together, for several hours, tannin and glacial acetic acid. The compound designated by the name tannigen is also an acetyl derivative of tannin, but differs from the compound of Schiff by only having two of its hydroxyls replaced by two acetic residues.

The author does not state how this difference may be attained. Tannigen occurs as a grayish-yellow, tasteless and odorless powder, slightly hygroscopic. It melts when dry without decomposition at 180° C. When heated with water to 50° C. it forms a viscous mass. It is not sensibly soluble in cold water or in dilute acids, slightly soluble in warm water and in ether, and freely soluble in alcohol, dilute solutions of sodium hydrate, phosphate, borate, etc.

According to the author it may be given in moderately large doses without inconvenience. It is not dissolved in the acid liquids of the stomach, but passes into the intestines where, on account of the alkaline liquids present, it dissolves and exerts its effects. It is recommended for chronic diarrhœa, in doses of 0·2 to 0·5 gramme, three times a day.